

TeraVision : a Platform and Software Independent Solution for Real Time Display Distribution in Advanced Collaborative Environments

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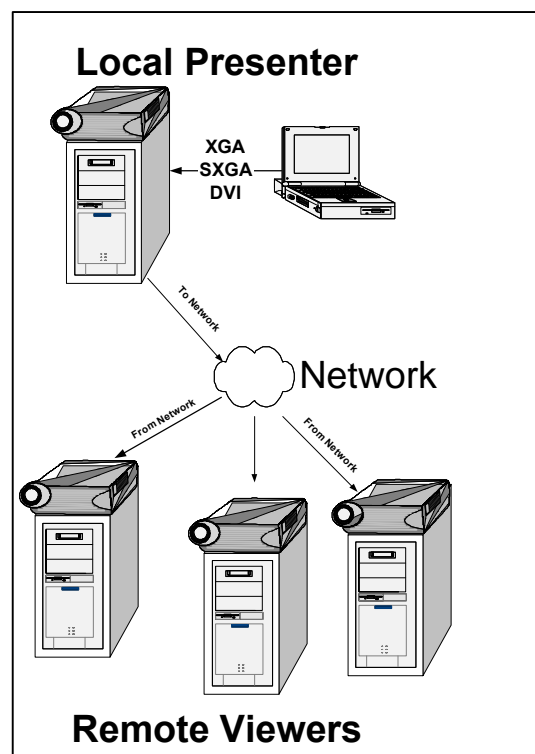
TeraVision is a way to distribute, in real time, the imagery on a visual display, running on any platform, without the need to modify any software or hardware on the host computer. TeraVision's goal is to provide one solution for what is commonly referred to as the "Docking Problem / Display Pushing Problem" on the AccessGrid. That is, to provide a means for anyone on the Access Grid to plug-in, for example their laptop, and to deliver a presentation without having to install or configure any software, or distribute any of the data files, in advance.

TeraVision is a hardware-based solution that ultimately amounts to a "network-enabled projector." An AccessGrid user who wants to give a presentation on his/her laptop or one of the nodes of a graphics cluster simply plugs the VGA or DVI-output of the host computer into the TeraVision Box (TBox), and the box will capture the signal at its native resolution, digitize it and broadcast it to other networked TBoxes (see Figure). Furthermore, using the TBox one can also transmit an entire tiled-display provided there are sufficient TBoxes at each end-point. In fact, two TBoxes can even be connected to the twin-heads of the stereoscopic AGAVE¹ system to allow streaming of stereoscopic computer graphics.

The TBox prototype will consist of a DLP projector connected to a PC with a high-speed frame grabber card and a high-speed network interface card (such as a Gigabit Ethernet NIC). Conceivably a vendor might ultimately be able to build a single printed-circuit-board solution that fits entirely inside a DLP projector. The prototype TBox software will provide point-to-point display sharing at first, to be followed by a broadcast distribution mechanism. This can either be provided via reliable multicast or a collection of TBox servers designated solely for data reflection. In the case where multiple TBoxes are needed to display a stereoscopic image or a tiled-display, the TBox software will need to ensure synchronization in both image-capture at the source, and display at the destination.

The main advantages of the TBox solution are that: a) it does not require one to modify the host visualization software; b) it is compatible with any display system that can provide a standard VGA or DVI signal; c) it scales to large tiled-displays providing there are sufficient TBoxes and bandwidth to support TBox streams; and d) image generation is decoupled from image capture and transmission- hence the host graphics system can operate at optimal frame rates.

The TBox will be demonstrated at IGrid 2002, in Amsterdam where a real time AGAVE Virtual Reality application will be streamed, in stereo, from Chicago to Amsterdam. The full paper will consist of a hardware and software specification of the TBox. Furthermore, the paper will discuss future problems that need to be solved for widespread deployment of TBoxes- such as how to multicast/broadcast high-bandwidth TBox streams; how to allow remote control of applications over the TBox; how to adapt the TBox for streaming CAVEs.



¹ AGAVE (Access Grid Augmented Virtual Environment) – A single dual-headed PC-based solution for rendering passive stereo computer graphics. Since its first prototype in January 2001, 12 sites in the Geosciences community have adopted it for undergraduate geoscience education and research. (www.evl.uic.edu/cavern/agave)